ISSUE 4: FOREST MANAGEMENT

Under proper management, forests can provide an abundance of clean air and water, sustainable harvests, increased forest products, a greater diversity of wildlife habitat, and improved recreation and aesthetics. In urban areas, managed forests provide a mitigation of temperature extremes, stormwater management, noise pollution control, an enhancement of local economies, healthy wildlife populations, increased rainfall infiltration/groundwater recharge, and can provide emotional relief from daily urban stresses.

The wide range of benefits and perceived values of forests are reflected in the focus of the USFS. Nationally, landscape-scale conservation is the objective. According to USFS Chief Tom Tidwell, "especially in an era of climate change, we need to restore the resilience of America's forests to disturbances of all kinds. The treatments needed will improve watershed health, increased water quantity, improved water quality, build community prosperity, and meet our shared vision of healthy sustainable forests."[110] Although the term "forest management" has been traditionally applied to timber production on a sustained yield basis with emphasis being placed on multi-uses, this current focus shows that forests may be managed for many goals and objectives.

Despite the benefits provided by managed forests, management of forests in rural and urban areas is not a common practice in Kentucky. Compared to a national average of 57%,[65] private individuals own 78% in Kentucky as shown in Figure 35. Of the remaining forestland, 5% is owned by national forests, 4% by other public agencies, 2% by forest industry and 11% by other corporations. Unfortunately, 88% of Kentucky family-forest owners surveyed by the National Woodland Owner Survey stated they had no written management plan, and only 17% had sought advice on managing their forested acreage.[8]

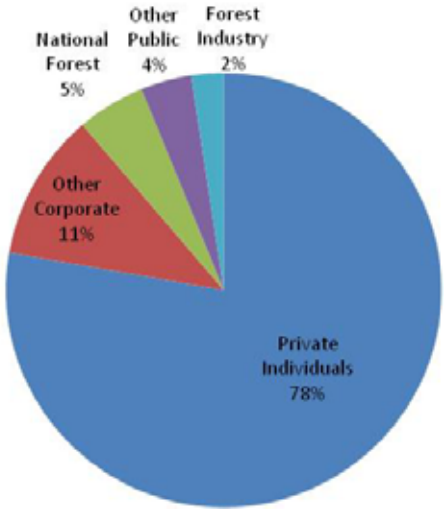

FIGURE 35 – KENTUCKY FOREST OWNERSHIP

As shown in Figure 36, private family-forest owners have many reasons for ownership with scenic beauty and natural diversity are amongst the top reasons cited.[101] Interestingly, the reason for owning the land has little influence on whether or not timber harvesting is conducted. While 82% of owners who stated that timber production was the reason they owned the land conducted a harvest, an average of 59% of owners who owned the land for other reasons had also conducted a harvest since they have owned the land. As shown in Figure 37, the reasons for timber harvesting are also similar regardless of the reason for ownership. Typically, harvests are conducted because trees are mature, owners need money or wood for personal use, natural catastrophes have damaged trees, or in order to improve the quality of the remaining timber. [101] Rarely is the harvest conducted because of a forest management plan indicating that efforts to increase public awareness of the importance of proper forest management remain a significant obstacle in Kentucky – one that will require a significant public education campaign to correct.

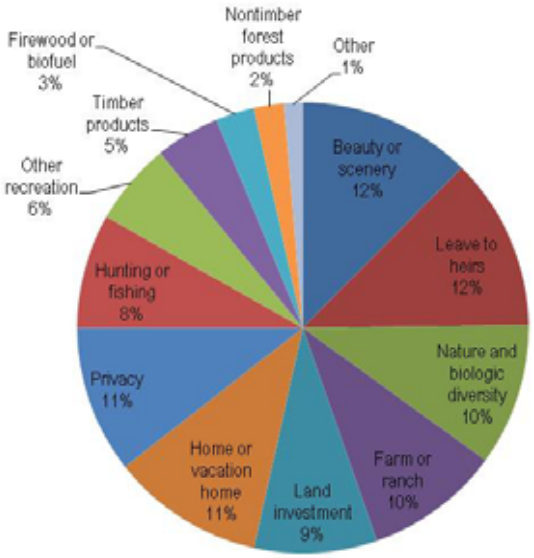

FIGURE 36 – KENTUCKY PRIVATE FAMILY FOREST LANDOWNER REASONS FOR OWNING FORESTS

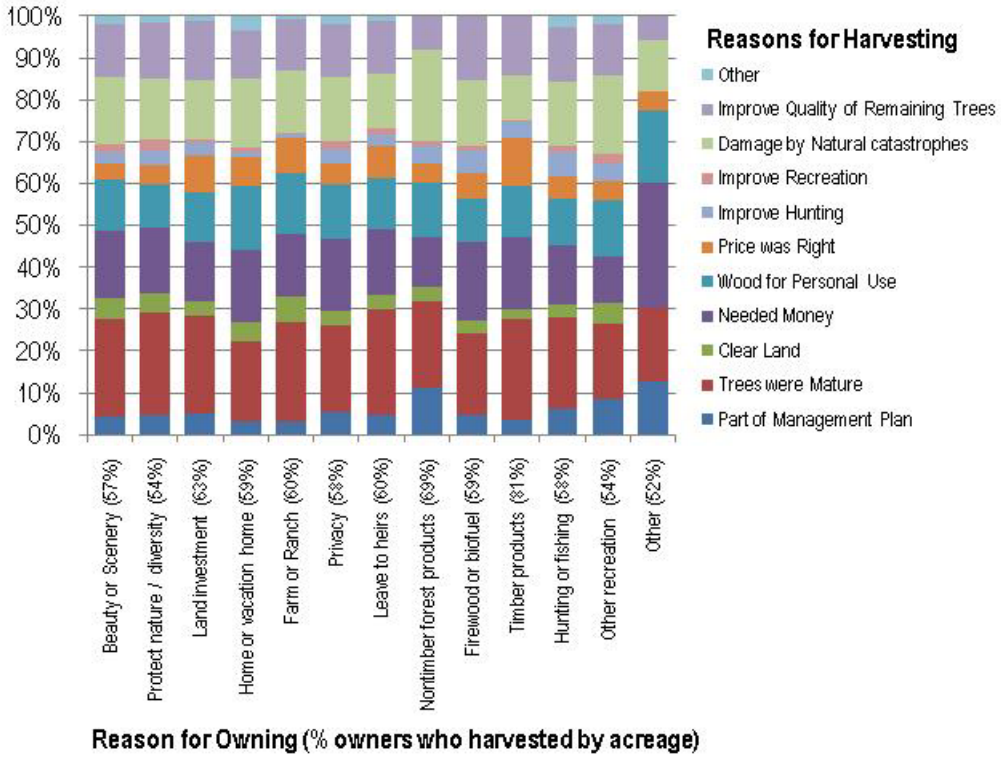

FIGURE 37 – KENTUCKY PRIVATE FAMILY FOREST LANDOWNER REASONS FOR HARVESTING TIMBER

A. Current Status of Forest Management in Kentucky

Forest management can be conducted in many different ways according to the desired use of the land. In order to address how forests are managed in Kentucky, these management types have been divided into six categories for this report: "hands-off" management, preservation management, recreational management, wildlife management, sustainable forest management, and urban and community forest management. While these management types have been divided for ease of discussion, some areas may employ multiple management types in order to accomplish their objectives.

Forest management can occur on a landscape, stand, or individual tree level. Although landscape level management is desired, management of rural forested areas typically occurs at the stand-level in Kentucky due to ownership patterns. Stands are defined by human disturbance or by common species composition and structure. Stand-level management can be applied to many desired uses including wildlife, environmental concerns, or optimal tree production. However, management can also occur on the individual tree-level. Currently, urban forest management often focuses on forestry at the individual tree-level. While such management is always necessary due to the presence of street-trees, many opportunities are available to expand urban forest management to the stand or landscape level.

1. "Hands-Off" Management

Many Kentuckians support a "hands-off" approach to management. While some promote this approach out of a desire to allow forest succession to progress unhindered, many do so simply out of convenience and passive neglect. To those who see the "hands-off" approach as an attractive conservation strategy, the *Southern Forest Resource Assessment* states "that removal of all human disturbances would have profound effects on the region's biota. Certainly, 'hands-off' management in one area will not necessarily counter-balance intensive management elsewhere. To avoid regional population declines and species losses, land managers must have the flexibility to promote active management…. This flexibility should not extend to the other extreme of promoting intensive forestry for wildlife conservation, but it does suggest that some level of active management will be necessary to maintain many still extant but imperiled species, including many found on present or proposed set-aside lands." [111] Even when landowners are opposed to timber harvesting or silvicultural management, active planning and management including inventories and invasive species monitoring is recommended to promote the best use of the resource.

However, based on the National Woodland Owner's Survey many of Kentucky's family private landowners plan to follow the "hands-off" approach to management. As shown in Figure 38 below, 55% of these landowners either have no plan or plan to leave the land as it is.[101] Because 54% have harvested timber since they began ownership, this may indicate a tendency towards passive neglect.[101] Particularly on lands that have developed based on human manipulation, active management is often necessary, even when the goal is preservation or resource protection. Managers should make conscious decisions about the desired use of forest and the best methods to achieve those goals.

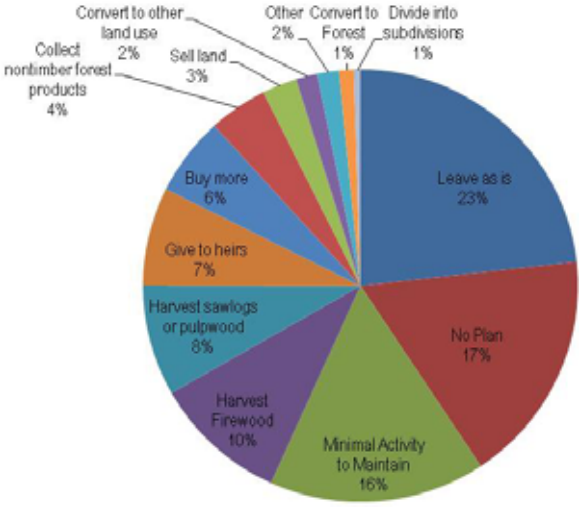

FIGURE 38 – KENTUCKY PRIVATE FAMILY FOREST LANDOWNER FUTURE PLANS FOR THE NEXT FIVE YEARS

2. Preservation Management

Some assume that by taking the "hand-off approach," they are engaging in management by preservation. However, preservation management is an active approach geared to protect unique and important resources, not a passive approach. For instance, the Kentucky HLCF, which provides funding for land conservation and preservation, requires grant applications to include management strategies addressing surveys for natural or historical resources, restoration of natural communities through methods such as tree planting, and enhancement of resources through methods such as removal of exotic invasive species, and ongoing maintenance and staffing.[112] Thus, preservation requires active management, unlike the "hands-off approach" to management used by many private landowners.

The KSNPC utilizes preservation as the primary management method on its management areas. It manages 45 forest preserves on a total of 18,750 acres. Blanton Forest on Pine Mountain in Harlan County is one such preserve that includes a total of 6,700 acres with 2,350 acres of old growth. In areas with old-growth, rare or endangered species, or other unique natural resources, preservation is used to protect these resources for future generations.

3. Recreational Management

Recreational use is popular in Kentucky forests, so forest management is often geared to accommodate many types of recreational use and deal with the impacts of such use. The Kentucky Recreational Trails Authority was created in 2005 out of a demand for citizens for more places to hike, cycle, horseback ride, and ride off-highway vehicles. Some of these active uses, such as horse riding and ATV riding, are in competition with one another for trail utilization. Other passive recreational activities such as bird watching also compete against these interests. Thus, managing for recreational use often involves active planning, proper trail design, and area use designations. Recreational trails also require regular maintenance due to the impacts of erosion and injury to surrounding vegetation caused by improper use, the spread of invasive plants along the corridors, and to maintain bridges or other manmade structures. Recreational managers may also enhance the aesthetic qualities of forests by plantings for color and clearing of fallen debris, or provide educational opportunities through demonstration areas. As the recreational use of Kentucky's forests expand, the need for increased management will also increase.

4. Wildlife Management

Active forest management for wildlife in Kentucky is very common. The economic benefits for those willing to lease land for hunting or other recreational activities aid in this popularity. Some industrial timberland in Kentucky is leased for hunting. Game species such as white-tailed deer, turkey, bobwhite quail, and waterfowl are primary management targets. Forest management can be augmented with techniques to directly enhance wildlife habitat for these game species and at the same time, non-game species. Wildlife management can be easily incorporated into existing forest management plans.

Wildlife can provide many aesthetic and recreational benefits to landowners such as wildlife viewing, hunting, and fishing. Increased habitat for wildlife also improves the ecological services provided by forested areas – every species in a functioning forest ecosystem performs a specific function that directly or indirectly benefits the environment and other organisms, including humans. Some birds disperse acorns and other seeds while others consume insects that would otherwise damage trees. Bats reduce mosquito populations. Earthworms help to turn over the soil and recycle nutrients. Numerous other complex relationships between wildlife are present in forests. Thus, in providing habitat for wildlife, numerous other benefits are also provided.[113]

Specific actions to create a variety of wildlife habitat primarily relate to a diversity of harvesting. Examples of specific actions include leaving mature trees in a stand to enhance structural diversity, retaining a variety of species/age-structure trees, clearcutting in small areas, and retention of snags (standing dead trees) to provide nesting habitat. Additional wildlife benefits may be obtained with natural regeneration techniques such as seedtree cuts and shelterwoods, and with management practices such as mid-rotation thinning and prescribed burning. Management strategies such as these are commonplace to promote habitat for threatened and endangered federal and state listed species. In Kentucky, the most notable example is the Indiana bat.

Kentucky's State Wildlife Action Plan provides information and the framework needed to protect the state's wildlife species and their habitats. The recommendations of this plan should be incorporated into wildlife management plans on forested areas in order to maximize the wildlife benefits of Kentucky forests.[67]

5. Sustainable Forest Management

Sustainable forest management (SFM) can be described as the attainment of balance between society's increasing demands for forest products and benefits, and the conservation and maintenance of forest health and diversity. This balance is critical to the survival of forests, dependant animal species, and to the prosperity of forest-dependent communities. As described in the introduction, forest management no longer concentrates solely on timber production but considers a multitude of other, occasionally conflicting, uses optimally applied across stands providing a multitude of environmental, economic, and societal benefits. In Kentucky, SFM is the primary approach advocated by the KDF to assist private forest landowners and is utilized on state-managed forestlands.

The Kentucky Forest Stewardship Program is one avenue by which the KDF promotes SFM to private forest owners. The service is provided for free to private forest owners who own ten or more acres of forestland and desire quality timber production, improved wildlife habitat, clean water, scenic beauty, or improved recreational use.[114] Landowners with less than ten acres can also receive assistance from the KDF although not under the national Forest Stewardship Program. Between 2004-2007 Forest Stewardship Plans were developed for 265,005 acres of forestlands in Kentucky. In 2008, plans were developed for an additional 74,433 acres, raising the total to 339,438 acres. The distribution of these plans is shown in Figure 39.

To financially assist landowners in implementing their stewardship plans, numerous federal cost-share programs that facilitate SFM are available. Kentucky is home to the award winning Green River Conservation Reserve Enhancement Program (CREP), which targets restoration and conservation of the Green River watershed, among numerous other programs. Other financial incentives that do not involve cost-share, such as agroforestry, carbon credits trading, or timber harvesting, allow landowners to profit from implementation of SFM.

Another indicator of the prevalence of SFM in Kentucky is the number of certified forests. Certification programs have been developed or adjusted to measure success in achieving SFM and to monitor changes in forest conditions over time.[115] The American Tree Farm System® (ATFS) is one such certification program. As of Dec. 1, 2009, Kentucky had few forests certified by the ATFS – only 791 tree farms encompassing 214,683 acres.

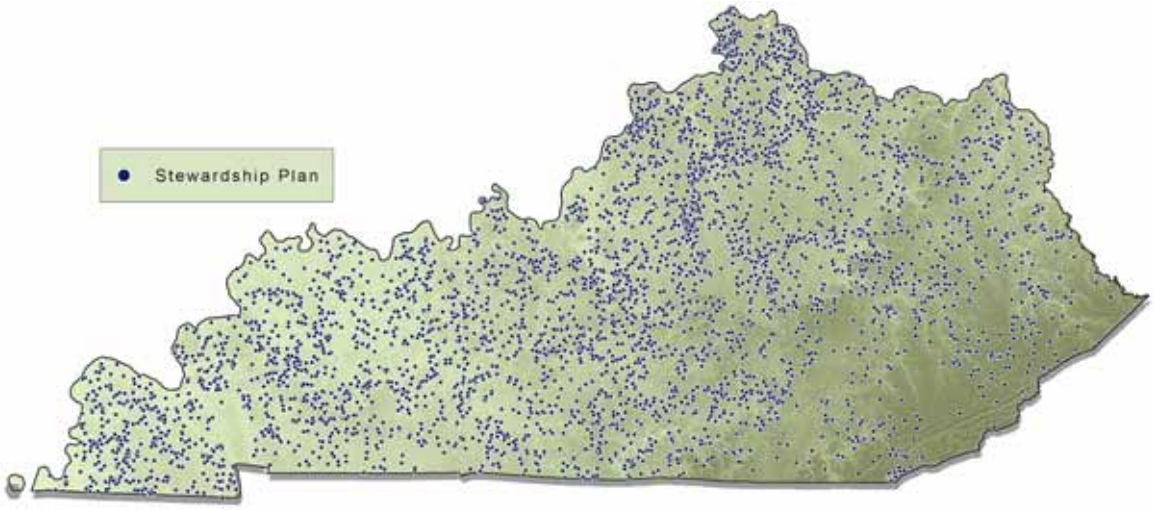

FIGURE 39 – EXISTING FOREST STEWARDSHIP PLANS AND POTENTIAL AREAS

State forests are also managed by KDF and its partners using the ecosystem approach to ensure biological diversity and sustainable use. They are managed as working forests and education demonstration areas exist in each. Figure 40 shows the location of the eight current state forests.

FIGURE 40 – KENTUCKY STATE FORESTS

6. Urban and Community Forest Management

In Kentucky, management of urban forestlands often does not receive as much attention as rural forestlands. However, the numerous benefits provided by urban forests can be sustained through active management, effective planning and ordinances, and citizen involvement.

In urban areas, trees help reduce temperature extremes and noise levels, conserve energy, and improve air and water quality. Trees also add character to cities and towns by providing aesthetic buffers, softening the outline of metal, glass and concrete, and providing space definition and landscape continuity.

Emotionally, trees create feelings of relaxation and well-being, provide privacy and a place for recreation, a sense of solitude and security, and have been shown to shorten post-operative hospital stays when patients are given room views of trees and open spaces[116].

Despite these advantages, communities suffer from improperly planted and neglected trees primarily due to the lack of public and private awareness and appreciation of the values of urban trees and forests. Often urban forestry objectives are low priority in smaller communities and are unfunded when local budgets are tight. Others simply assume that there is no need to manage urban trees.

In an effort to improve urban forest management, the Kentucky Urban and Community Forestry Council serves in an advisory role to the KDF on urban forestry issues. The Council supports urban forestry by providing a forum of learning and information distribution and by participating in active research to determine the most effective ways to properly manage urban forests. Additionally, the Arbor Day Foundation administers the Tree City USA®, Tree Campus USA®, and Tree Line USA® programs that, in cooperation with the USFS, the National Association of State Foresters, and state forestry agencies "provides direction, technical assistance, public attention, and national recognition" for communities, colleges, and utilities respectively.[117] Kentucky has 37 cities, 1 college, and 2 utilities recognized by these programs.

Overall, tree cover in urban areas east of the Mississippi River has declined by about 30% over the last 20 years while the footprint of the urban areas has increased by 20%.[75] American Forests, a non-profit forestry organization, advocates that every city set a tree canopy goal but recommends that reasonable goals for Kentucky include 40% overall coverage with 50% coverage in suburban areas, 25% coverage in urban residential areas, and 15% in business districts.

In Kentucky, the Northern Kentucky Urban and Community Forestry Council conducted extensive studies of its forest resources. Analysis of forest cover in this primarily urban area found 41% forest cover in Kenton County, 38% cover in Boone County, and 42% cover in Campbell County. Although the canopy coverage is high, most of these forests are composed of small crown cover with minimal large crown trees.[118] A benefit analysis has also been conducted in this area on the cities of Bellevue, Covington, Florence, Fort Thomas, and Newport in 2007. According to their reports, 11,867 trees covering 4.3% of land are located in these cities, providing over $17 million dollars worth of carbon storage and air pollution ecosystem benefits.[119] Thus, although the county-wide forest coverage is adequate, the coverage within these cities has much room for improvement. Similar studies could be conducted throughout the state to identify additional planting needs and opportunities.

B. Direct Threats

While each of the forest health-related threats are also threats to forest management, forest management itself is threatened by the fact that management in the predominantly privately-owned forests of Kentucky (and the Southeast in general) is not commonplace. Of the 78% of the forestland in private family ownership, 88% of those ownerships have not sought professional management advice.[8] A combination of factors is responsible for this situation.

Part of this problem may also be a lack of awareness about the services available from the KDF and the Kentucky Association of Consulting Foresters. Many of the private landowners do not understand long-term investment opportunities associated with timber value and some may not understand that the timber has any value at all, particularly on small lots. Even when private landowners harvest their timber they

seldom request the advice and services of consulting foresters or the KDF. Although KDF has a very good Web site that contains the services available from KDF, many landowners still do not use computers. Therefore, the only way to reach them may be through outreach programs, public notices and direct contact. Many such programs exist, but may require targeted expansion to particular regions, such as eastern Kentucky, where there are few Forest Stewardship Plans. In addition, the reduction of the capacity at the KDF has lengthened the time required to prepare a management plan, which may dissuade some forest landowners.

Others may know about the services available, but may not be interested due to the risks. Natural risks such as wildfire, wind damage, ice damage, and drought can damage the forest at any given time during the rotational period, which may range up to 80 to 100 years. Insects, diseases and non-native invasive plant species may also be expensive to manage and may result in substantial losses to the forest.

The risk of decreasing timber values may also deter landowners from management. The wood industry that produces products such as cabinets, hardwood flooring, millwork, cooperage, dimension components, hardwood pallets, crossties etc., both in Kentucky and nationally, has recently experienced a sharp decline. The health of the secondary wood industry is directly connected to the national economy and specifically to housing starts and remodeling, for which many of the products produced by the industry in Kentucky are manufactured. Several facilities in Kentucky have closed as a result of the declining economy. According to the Hardwood Market Reports, the cabinet, furniture and flooring industries have experienced average reductions of 35%. Housing starts have declined by 50% since 2007. Timber stumpage prices have declined by 30-35%. It has been speculated that improvements in the market conditions may begin to improve in early 2010 with more significant improvements by 2012.[120]

Others may be affected by the long-term commitment that forest management requires. Forest management is labor intensive and can be expensive. As 64% of the private forest landowners in Kentucky are 55 or older[101], many landowners may not be able to physically manage the manual labor or find help willing to aid in the work. The lack of market for woody debris and low quality trees makes such work undesirable for commercial loggers. Investments made today by landowners may not be recovered for several years and may not be recovered by the current landowner of the property. Considering the risks involved in long-term forest management previously discussed, some landowners are just not willing to invest the time and expense required. Although several cost-share programs are available to landowners, there still seems to be a lack of incentives attractive enough to encourage them to pursue forest management opportunities or that they are unaware of the opportunities.

Distance from the property may also be factor. Just under 10% of non-industrial forest owners who participated in KDF programs were absentee owners. These absentee owners were located primarily in Jefferson, Fayette, Boone, Kenton, and Campbell counties, all largely urban areas. On average, in-state absentee landowners lived 42 miles from their ownership, which were largely in north central Kentucky.[121]

Other possible factors responsible for a lack of management include:

- Disconnect from the forests
- Multiple owners with competing interests
- Public perception with “ugly” harvesting
- Mistrust of government / technical advice / funding
- General lack of priority for landowners
- Change in demographics from rural to urban society with diverse values

C. Opportunities

The potential for proper forest management does exist in Kentucky. Based on a GIS analysis performed by the KDF (see Figure 39), only 2.76% of the 12,288,720 acres capable of stewardship currently have Forest Stewardship Plans. While this area does not include plans developed before 2004 by the KDF, or plans developed independent of the KDF, it shows that management opportunities are abundant in Kentucky. Examples of the widespread appeal of existing management programs give indication that, with proper education and interaction with private landowners, forests can be optimized for sustainable growth and development.

1. Certification Programs

a. American Tree Farm System® (ATFS)

ATFS certifies land management to the American Forest Foundation's Standards of Sustainability. Under these standards, private forest landowners must develop a management plan and pass an inspection by an ATFS volunteer forester. Since 2008, ATFS has certified 24 million acres of privately-owned forestland managed by over 90,000 family forest landowners, making it the largest private forest conservation program in the U.S. ATFS reinforces its commitment to forest conservation through continuing education opportunities and outreach activities. ATFS certification is currently free for landowners.

b. Sustainable Forestry Initiative® (SFI)

Sustainable Forestry Initiative® (SFI) Inc. is a fully independent, non-profit organization dedicated to promoting sustainable forest management. Both SFI and AFTS are part of the international non-profit, non-governmental organization, Programme for the Endorsement of Forest Certification (PEFC). SFI works with conservation groups, local communities, resource professionals, landowners, and countless other organizations and individuals who share its passion for responsible forest management. The SFI forest certification standard is based on principles that promote sustainable forest management, including measures to protect water quality, biodiversity, wildlife habitat, species at risk, and forests with exceptional conservation value. The standard is used widely across North America, and has strong acceptance in the global marketplace so a steady supply of third-party certified wood from well-managed forests can be delivered. This is especially important because of the growing demand for green building and responsible paper purchasing at a time when only 10% of the world's forests are certified.

c. The Forest Stewardship Council (FSC)

Forest Stewardship Council is a non-profit organization devoted to encouraging the responsible management of the world's forests. FSC sets high standards that ensure forestry is practiced in an environmentally responsible, socially beneficial, and economically viable way. Landowners and companies that sell timber or forest products seek certification as a way to verify to consumers that they have practiced forestry consistent with FSC standards. Independent certification organizations are accredited by FSC to carry out assessments of forest management to determine if standards have been met. These certifiers also verify that companies claiming to sell FSC certified products have tracked their supply back to FSC certified sources. This chain of custody certification assures that consumers can trust the FSC label.

FSC's model of certification allows products that flow from certified forests to enter the marketplace with a credential that is unique. Any FSC-labeled product can be traced back to a certified source. This aspect of the system is the basis for any credible certification system and is the link between consumer preference and responsible, on the ground forest management.[122]

Although SFI and FSC present opportunities for certification, they are cost prohibitive to the majority of Kentucky's landowners. Therefore, Kentucky has few SFI and FSC certified acres. The use of such programs could increase if costs were reduced. Since timber harvesting is often occurring in Kentucky regardless of the desired use of the land, many Kentuckians could benefit from timber sales if their forests were certified. Currently, the University of Kentucky and partners are developing a Collaborative for Woodlands and Wood Certification as an incubator for certification and to create cost savings for small woodland owners to benefit from certification.

2. Urban Forestry Programs

Urban forests are increasingly being recognized for the economic, environmental, and social benefits they provide to communities. The Tree City USA®, Tree Campus USA®, and Tree Line USA® programs, administered through the Arbor Day Foundation and the KDF provide an example of how urban forest benefits can increasingly be promoted.

The primary function of the Tree City USA® is to "inspire people to plant, nurture, and celebrate trees."[117] The Tree City USA® benefits to communities are summarized by the following six categories:

1. Framework for action – provides initial direction for an urban forestry program
2. Education – connects a community to state foresters through which information is disseminated
3. Public image – presents a positive community image pertaining to quality of life
4. Citizen Pride – recognition promotes care of trees and a willingness of individuals to volunteer for additional programs
5. Financial assistance – the award of forestry-related grants are occasionally given preference to Tree City USA® communities
6. Publicity – presentation of the Tree City USA® award and the celebration of Arbor Day offer excellent publicity opportunities for a community

Lexington has the longest active enrollment in the Tree City USA® program state at 21 years.[123] Although 37 cities in Kentucky are currently enrolled, participation of Kentucky communities in this program could be further expanded. In 2009, a record ten communities (Bowling Green, Fort Thomas, Henderson, Mayfield, Munfordville, Owensboro, Prospect, Richmond, Southgate, and Warren County) received Growth Awards for expanding their urban forestry programs.

The Tree Campus USA® program recognizes colleges and universities using effective tree management programs, connecting with the community to foster healthy urban forests, engaging the student body in campus forestry efforts. In order to be recognized as a Tree Campus USA® college, colleges must have a campus tree advisory committee, tree care plan, tree program with dedicated annual expenditures, observe Arbor Day, and provide a service learning project according to the program standards. The program began in 2008, and the inaugural list of colleges featured Northern Kentucky University among the 29 colleges recognized nationwide.

Similar to Tree City USA®, the Tree Line USA® recognizes utilities and the Tree Campus USA® recognizes colleges with tree programs. The Tree Line USA® program is focused on best practices of quality tree care, annual worker training, and tree planting and publication among utility companies. In 2009, only the Bowling Green Municipal Utilities and Owensboro Municipal Utilities were recognized by Tree Line USA®.

The 113th anniversary of Arbor Day was celebrated in 2009 on the traditional date of the first Friday in April. All 120 County Judge/Executives signed proclamations for its celebration. For use in Arbor Day events, 98

conservation districts purchased 129,000 seedlings from the KDF tree nurseries which were matched by an additional 58,176 seedlings by the nurseries. In total, 219,246 tree seedlings were sold or donated for Arbor Day and Earth Day in 2009, 171,000 less than in 2008. Thirty-three schools purchased seedlings for Arbor Day activities.[124]

In addition to these events and programs, software programs such as CITYgreen or i-Tree are publicly available and may be used to "help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and the structure of the urban forest."[125]

Overall, the goal of urban forestry programs is to build local capacity to manage urban forests and to encourage citizen involvement.

3. Cost Share and Grant Programs

The KDF partners with a variety of federal and state cost-share programs in order to help landowners finance the implementation of forest management practices. Table 4 lists some of the more common programs and their funding sources. Funding of these programs can change rapidly, as demonstrated in the 2008 Farm Bill in which funding for the Forest Land Enhancement Program was removed; the EQIP was fully funded, and the WRP funding was reduced by about 25%. The NRCS is the primary administrator of Farm Bill funding in Kentucky.

In Kentucky, Urban and Community Forestry Assistance grants are offered through KDF through the America the Beautiful program authorized by the Forestry Title of the 1990 Farm Bill. The division administers this program in cooperation with the Kentucky Urban Forestry Council. The goal of this grant program is to encourage citizen involvement in creating and supporting long-term and sustained Urban and Community Forestry programs. Though not available in 2009, this grant program should be available in the future.[126]

The Kentucky Heritage Land Conservation Fund (HLCF) also provides a source of funding for land preservation and conservation. The HLCF funding is generated through the Nature License Plate, unmined minerals tax, and environmental fines. Access to the HLCF is focused on:

- Natural areas that possess unique features such as habitat for rare and endangered species
- Areas important to migratory birds
- Areas that perform important natural functions that are subject to alteration or loss
- Areas to be preserved in their natural state for public use, outdoor recreation and education[127]

These funds are distributed 50% to local governments, colleges, universities, and other agencies, 10% to the KDFWR, 10% to the Department of Parks, 10% to KSNPC, 10% to the Kentucky Wild Rivers Program, and 10% to the KDF.

Although many such cost-share programs are available, they often require a Forest Stewardship Plan in order to receive the funding. The KDF currently lacks the forester capacity necessary to meet the increased public demand for providing stewardship and management plans. Additional staffing would aid in increasing the use of such program as well as other opportunities such as ATFS certification, carbon credit trading, or biomass marketing.

TABLE 4 – COMMON COST SHARE PROGRAMS FOR FORESTRY PRACTICES

COST-SHARE PROGRAM	PROGRAM OBJECTIVE	APPLICABILITY AND RATES
Conservation Reserve Program (CRP)	Restore riparian corridors in crop and pastureland; remove highly erodible cropland from production	50% over 10 to 15 years but with an annual rental payment based on site productivity
Environmental Quality Incentives Program (EQIP)	Promote agricultural production, forest management, and environmental quality to optimize environmental benefits	Incentive payments available to complete conservation improvements in 1 to 10 year contracts
Wetland Reserve Program (WRP)	Protect, restore, and enhance the functions and values of wetland ecosystems	30-year or permanent easement, payment based on contract
Wildlife Habitat Incentives Program (WHIP)	Protect, restore, develop, and enhance wildlife habitat	Incentive payments available to complete conservation improvements; 5 acre minimum; 1 to 10 year contracts
Healthy Forest Reserve Program	Easement program to restore, enhance, and protect forest ecosystem functions	30-year contracts and 10-year cost share agreements; restricted to Cumberland River Basin Watershed
Conservation Stewardship Program	Conserve and enhance soil, water, air, and related natural resources	Annual payments on 5 year contracts for new and existing activities
Farm and Ranch Lands Protection Program	Purchasing development rights to keep productive farm and ranchland in agricultural use	Up to 50% of the fair market easement value of the conservation easement

4. Economic Incentives

Economic incentives are often the easiest way to promote new ideas. Due to the financial significance of forest-related products, Kentucky stands to benefit greatly from sustainable management. Traditionally wood products have stimulated forest management, and practices such as agroforestry provide alternative ways to produce revenue on forestland. Currently, many policies are being discussed and developed nationally in regards to carbon sequestration and biofuels for energy.

According to the USFS, "international and national government policy on the management of forests is a subject of lively debate in most countries of the world. Forest policy dialogue is far-reaching…. The topics under discussion … include sustainable forest management, trade issues, economic growth in underdeveloped areas, land tenure and rights, national security, biodiversity, and land use. Reflected in this dialogue is a range of perspectives on how a forest's many values and benefits should be used, conserved and protected. The debate reflects the breadth of stakeholders' interests – often a challenge in trying to reach a consensus position."[128]

a. Wood Products

The U.S. is the world's leading producer of lumber and wood products used in residential construction and in commercial wood products such as furniture and containers. As discussed further in Issue 5, Kentucky is the third largest hardwood lumber producing state, producing $6.3 billion in total wood product manufacturing shipments in 2004. The forest industry contributes $8.7 billion to the Commonwealth's economy when all direct, indirect, and induced effects are included.[8] One hundred twelve of 120 counties have some type of forest industry.[129] Nontimber forest products (NTFP) derived from the forest include

ginseng (most valuable, with annual harvests of several million dollars), bee products, native and exotic mushrooms, maple syrup, craft materials, fence posts, and fuel wood.

b. Biofuels

Wood is a renewable resource that can be stored in various forms and is available in most of the U.S. Biomass is a term used to describe plant materials, especially those that can be converted to some form of energy or fuel. Biofuels (fuels from biomass) are attractive sources of energy because they are renewable. Biofuels are considered carbon-neutral which means that the carbon released when these materials are used for energy is absorbed at about the same rate by the plant materials grown to replace what initially was used.[130] The federal renewable fuels standard calls for producing 30% of the nation's energy from biomass by the year 2030.

According to a Sun Grant Initiative study[131], in 2003 the Commonwealth of Kentucky consumed an estimated 1,877.2 trillion British thermal units (BTUs) of energy, 18th in the nation. Coal accounted for 50% of the total energy consumed with petroleum providing another 35%. Other major energy sources were natural gas (12%) and hydroelectric (2%). Biomass supplied over 25.1 trillion BTUs, which was less than 1% of the state's energy needs ranking 29th nationwide. Total energy consumption in Kentucky increased by 480 trillion BTUs between 1980 and 2001, an average annual increase of 1.4%.

According to Governor Steve Beshear's *7-point Strategy for Energy Independence*[132], Kentucky's renewable energy is planned to triple by 2025 with 50% of the potential contribution from forests. The report estimates that approximately 9.18 million dry tons of biomass could potentially be harvested annually, recovered, or specifically grown for biomass fuel in Kentucky without diverting biomass from existing uses. Assuming a heating value of 8,000 BTUs per dry pound, this resource could provide up to 147 trillion BTUs of renewable energy potential each year; however, because of marketplace pressure it is assumed that Kentucky's forests would only contribute 66.9 trillion BTUs of energy by 2025. This is 2.5 times the current woody biomass energy production.

In a subsequent analysis of these estimates,[133] the *Executive Task Force on Biomass and Biofuels Development in Kentucky* found that more information was necessary to ensure effective and sustainable woody biomass production in Kentucky. Some of the research needs identified include accurate estimates of the available biomass, appropriate harvesting techniques, incentives for certification and management, and development of educational programs. Research of sustainable harvesting techniques is particularly important due to the increased risk of soil erosion and impacts to water quality, as well as threats to forest communities. However, the development of woody biomass products is forecasted to provide future jobs and income, decrease energy costs, and provide landowners an opportunity to grow trees on a short rotation. All of these benefits provide incentives to participate in some form of forest management.

c. Agroforestry

Agroforestry is an integrated agricultural method that employs the interactive benefits of combining trees and shrubs with crops and/or livestock. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy, and sustainable land use systems.

Farmers have practiced agroforestry for decades in other countries. The primary focus of agroforestry is the incorporation of a wide range of working trees into farms. According to the World Agroforestry Centre, "specific groups of trees include "fertilizer trees for land regeneration, soil health and food security; fruit trees for nutrition; fodder trees that improve smallholder livestock production; timber and fuelwood trees for

shelter and energy; medicinal trees to combat disease; and trees that produce gums, resins or latex products. Many of these trees are multipurpose, providing a range of benefits.

Agroforestry provides many livelihood and environmental benefits, including:

- Enriching the asset base of poor households with farm-grown trees
- Enhancing soil fertility and livestock productivity on farms
- Linking poor households to markets for high-value fruits, oils, cash crops and medicines
- Balancing improved productivity with the sustainable management of natural resources
- Maintaining or enhancing the supply of environmental services in agricultural landscapes, for water, soil health, carbon sequestration and biodiversity"[134]

d. Carbon Sequestration

Currently, carbon credits are a commodity traded on the Chicago Climate Exchange and a growing range of other markets. Through MACED's Forest Opportunities Initiative, landowners can participate in carbon trading that benefits them financially and in turn reduces carbon in the atmosphere.[135] Enrollment is open to private forest owners in the Appalachian region of Kentucky, Ohio, Tennessee, Virginia, and West Virginia. The minimum forested area allowed for the program is 30 acres. Other requirements include a forest certification, a commitment to a sustainable management system for 15 years, proof of ownership, a forest inventory, and finally a contract must be signed acknowledging and agreeing to the program rules. Based on 2008 averages, landowners can expect to receive approximately $7.50/acre per year.

Other known carbon aggregators working within Kentucky include:

- AgraGate
- Kentucky Corn Growers' Association's Forestry Offset Program
- GreenTrees
- Ducks Unlimited
- FORECON Ecomarket Solutions, LLC
- The Delta Institute
- Dogwood Carbon Solutions

All entities have expressed interest in forest carbon marketing within Kentucky and their presence will be driven by future carbon markets and competition.

e. Tax Credits and Deductions

A reforestation tax credit and amortization deduction allows landowners to immediately deduct up to $10,000 of qualifying reforestation expenses annually per qualified property when reporting federal income taxes. Many forestry management costs, including site preparation, seedlings or seeds, planting, tools, and depreciation on equipment, may be included. Cost-sharing funds may be included if reported as income. Additionally, landowners can deduct all reforestation expenses incurred in any one year that cannot be expensed, without limit to the amount. These expenses can be deducted from gross income that comes from other sources over an 84-month period.

In addition to the reforestation tax credit, cost-sharing payments can be excluded from income. Federal tax laws allow a landowner to partially or totally exclude cost-sharing payments received under certain programs from taxable income. It is advisable to check with a tax advisor to determine eligibility but most people will gain maximum tax advantage by including the payments as income and reporting any un-

reimbursed expenses that qualify for the investment credit and amortization deductions discussed in the previous section.

Finally, annual deductions for part or all of the forest management expenses incurred each year may be deductible, even if no timber income is received in that tax year. The Tax Reform Act of 1986 instituted passive loss rules that dictate how a forest landowner may deduct expenses.

5. Education

Education opportunities are an important part of increasing the amount of management occurring on Kentucky's forestlands. The KDF Forest Landowner Education Program assists private forest landowners by educating them about the importance of their forestland and by providing technical information through forestry field days and offers suggestions on how to harvest and sell their timber. Some of the educational efforts on forest management include the woodland owners' short courses, carbon sequestration information, timber theft and trespass information, assessing storm damage, timber tax information, ATFS and Kentucky Woodland Owner's Association information, Kentucky Firewise Community Grants Program, and forestry education for the general public.[136]

One specific example of how educational efforts could be expanded is increased distribution of the *Kentucky Woodlands Magazine,* an important resource for non-industrial private forest owners. An investigation of the mailing distribution for this magazine found that most subscribers are located in central Kentucky and that few subscribers are located in the eastern third of the state where forest resources are concentrated. They found that increased distribution of the *Kentucky Woodlands Magazine* to landowners in the southeast could significantly impact Kentucky's forest ecologically and economically.[121]

The Woodland Owner Short Course is an excellent educational opportunity available for private forest landowners. Through a partnership of University of Kentucky Department of Forestry, KDF, and numerous other agencies and organizations, courses for children and adults of all experience levels aid in educating the public on how management goals may be achieved. The day-long courses are periodically available for minimal costs at select locations throughout the state. By expanding the geographic locations offering the courses as well as their frequency, the participation in this educational opportunity may be expanded.